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(U) PROGRESS REPORT ATLAS BOOSTER PROGRAM FOR NASA PROJECT MERCURY

Prepared by
Mercury Atlas Launch Vehicle Program Office

Contract No. AF 04(647)-930

1 - 31 August 1961

Prepared for
DEPUTY COMMANDER AEROSPACE SYSTEMS
AIR FORCE SYSTEMS COMMAND
UNITED STATES AIR FORCE
Inglewood, California

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This report reflects the progress and status of AFSSD/AEROSPACE and associate contractors' effort in the Atlas Booster Program for the NASA Mercury Project. The report covers the period 1 August 1961 through 31 August 1961.

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FOR ROBERT H. BRUNDIN
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I. PRODUCTION

A. Boosters

1. 88D/MA-4

The Factory Rollout Inspection Report for Mercury/Atlas Booster 88D was delivered to AMR on 22 August for use during the Data Presentation to the Flight Safety Review Board at AMR. This report contains a brief history of the events leading up to the final factory rollout of Mercury booster 88D, and subsequent delivery to AMR.

On August 24 the spare gyro canister for 88D, returned from AMR because of a faulty amplifier, was found to have in the amplifier circuit an intermittent short from a Transitron 2N335 transistor.

Internal inspection of the transistor revealed that small globules of solder were formed during manufacture when the evacuation hole in the body of the transistor-cover was sealed by a solder-dipping process. This caused one or more solder "pellets" to appear inside the case which produced an intermittent short in the transistor elements. As a result of this discovery, several other transistors of the same manufacture were opened and found to have the same problem. Therefore, the launches of booster 88D and of all Atlas missiles were delayed for investigation and retrofit. The following canisters were removed from 88D and cleared of all transistors which were manufactured using the same above mentioned process. (Transitron transistor types 2N332, 2N335, 2N343, and 2N498 were removed and replaced by the same number of GE units which had been X-rayed and vibrated.):

Abort System Control Unit
Autopilot Servo Amplifier
Autopilot Programmer
Autopilot Gyro Group
Autopilot Forward Group
Bendix Telemetry (critical circuits only)
Range Safety Command Three-Second Timer

Note: The Mercury light-weight telemetry will also be manufactured with new terminal boards containing the approved type transistors.

2. 93D/MA-5

Mercury booster 93D is still in the final checkout area and will have the following changes above the initial configuration which was composite tested and reviewed on 25 July 1961:

a. -805 flight control gyro canister (5 resistors have been increased from 1 to 2 watt types).

b. ECP 1001 (Flight Control System Spin Motor Monitor Modification).

c. The light weight telemetry will be modified in accordance with ECP 1268R1 (Addition of Channel 13 and E).

d. Complete list of telemetry measurements will be installed with the exception of A110P (adapter delta measurements) which will be a field installation. All systems will be cleared of transistors which could have the "solder globule" problem mentioned in paragraph A above.

3. 109D/MA-6

109D/MA-6 is in final checkout and delivery is anticipated approximately three weeks after that of booster 93D/MA-5.

II. SUBSYSTEMS

A. Airframe

The analyses of the retropackage catcher (for a possible off the pad abort) have been thoroughly investigated by MAC, NASA and Aerospace. These analyses as performed by the NASA team, indicated that the system is adequate under the contingencies considered; however, the magnitude of the margin is not as large as exists in the other Mercury systems. Other factors considered in determining the adequacy of the present system are the low off the pad abort probability, the probability of relays requiring maximum times to latch during any one sequence, and the imminence of a booster explosion under such abort conditions. Based on the NASA/STG conclusion that the system is adequate, SSD/GD-A/Aerospace will not take any corrective action to strengthen the booster dome for subsequent flights.

The dent incurred on the 88D fuel tank during the loading operation at GD-A/San Diego was investigated by GD-A/Aerospace to determine the extent of the damage. The evaluation of the damage was conducted by inspecting for any external surface cracks, comparing the magnitude of the dent with prior laboratory and field test results on similar dents, and investigating the effect of the tanking test. The investigation concluded that no repair is required for MA-4 Mercury flight.

The angle of attack sensor study is continuing. The purpose of this study is (1) to correlate better the flight characteristics from the balloon soundings with actual flight telemetered data; (2) to improve the confidence level of the alpha-q calculations performed prior to flight test; and (3) to increase the allowable alpha-q for launch. The analysis to date has shown that both angle of attack sensor and altitude sensor are required to satisfy the above purposes. The accuracy requirement for these transducers is still being investigated. Concurrent with this study, methods of obtaining better wind shear data are continuing as a means of satisfying the need of angle of attack measurement.

B. ASIS

1. Configuration - No Abort System configuration changes were made during the reporting period.

2. Production and Test

a. MA-5 The Abort System Control Unit installed in missile 93D was inspected for Transitron transistors. All Transitron components were replaced by transistors manufactured by GE.

The real time recording tests have been performed on missile 93D. However, a clean tape has not yet been run. Such data will be made available for review by Aerospace at the time of the 93D rollout.

b. MA-6 The Abort System Control Unit installed on missile 109D will be inspected for Transitron transistors.

3. Flight Test

a. Complex 14 During reliability testing of the Abort System Control Unit a short circuit occurred on the 115v ac input line resulting from interference between the harness and the mounting stud. This deficiency was eliminated by shortening the stud. The abort control units allocated to AMR for MA-4 were returned to San Diego for this mandatory rework. The units were tested prior to their return to AMR.

The Abort System portion of 88D was tested and approved for flight test during the week of 20 August. Subsequent to the decision to investigate the various missile subsystems for faulty Transitron transistors, the flight article abort canister and the spare were removed and returned to San Diego for inspection. These units were found to contain Transitron components which were removed and replaced by parts manufactured by GE. A complete series of Abort System tests will again be performed prior to the launch of missile 88D.

The differential pressure restrictor assembly with particle screens on either end was installed prior to the launch of 88D. The test data for this component was reviewed and the part considered acceptable.

b. Hangar A new rate table has been installed in the GD-A gyro laboratory. This equipment is sufficiently accurate to permit marriage tests to be performed between the autopilot and the Abort System at AMR rather than returning the equipment to San Diego as was previously required.

4. General

TWX AS 1933.21-770, Subj: Evaluation of Missile 21E Flight Data with respect to ASIS Parameters, was transmitted to NASA/STG 15 August.

TWX AS 1933.21-772, Subj: Evaluation of Missiles 18E and 95D Flight Data with Respect to ASIS Parameters, was transmitted to NASA/STG 15 August.

TWX AS 1933.21-772, Subj: ASIS Evaluation of Missile 13E, was transmitted to NASA/STG 8 August. This TWX was followed by an Aerospace letter AS 1933.21-762, dated 16 August, transmitting Missile 13E plots as a portion of the evaluation . As a result of this evaluation, GD-A was directed by SSD/BSD/Aerospace to monitor PU valve position via landline and telemetry for all Mercury launches and advise NASA Mercury control center of any abnormal condition. This procedure will be used starting with the launch of missile 88D.

During the reporting period three Abort System Control Units completed Search for Critical Weakness reliability tests. Life testing and Search for Critical Weakness testing were complete on all 2.5 psi differential pressure switches. These units completed testing satisfactorily. Testing is still in process on the Servonics 11.0 psi and 21.5 psi lox tank pressure switches. Present

indications are that these tests will show the components to be satisfactory.

C. Azusa

GD-A was given a list of frequencies at which to measure Azusa antenna VSWR to assure adequate operation during flight. These data, along with the Azusa antenna patterns, will be furnished two weeks prior to missile rollout inspection.

D. Electrical

Main missile batteries manufactured by the Eagle Picher Company will be used for the first time on Mercury booster 88D. All engineering evaluation tests have been completed and it is intended that this inherently more reliable battery will be used on all future Mercury vehicles.

E. Flight Control and Hydraulics

As mentioned in IA, all terminal boards used on flight control systems for Mercury boosters will contain only GE or Texas Instrument transistors which have been X-rayed and vibrated prior to installation.

A Contractual Action Request (CAR) was issued requesting the modification of AMR Complex 14 hydraulic pumping unit (HPU) to improve the system's filtering abilities. The modification, improving the system's filtration and providing cleaner Atlas hydraulic fluid, was engineered and proven under Golden Ram to improve the missile hydraulic system reliability. The changes to the HPU are simple, consisting of the addition of two micron Bendix Microedge filters at the discharge and an electrostatic precipitation filter in the return of the HPU. Incorporation of this modification on the Mercury launch complex will make it possible to launch each Mercury/Atlas booster with a clean hydraulic system and with the attendant improvement in reliability. GD-A has been requested to implement this complex modification prior to the launch of 93D.

A potential problem may develop on the vernier engine actuators. The approved vernier actuators are made by Interstate Engineering Corporation. Interstate was recently purchased by a company named Clemco. Clemco, it appears, has made changes in the vernier actuators, one of these being an actuator shaft material change. The result of these changes is reported to yield an inferior quality actuator. Since the Interstate actuators, are, or were, the only acceptable parts, with no alternate source available, the reported situation is

deemed critical with respect to Mercury boosters. An investigation is presently underway to determine the complete facts and their effect on Mercury.

F. Guidance

1. Airborne

To assure adequate guidance antenna gain and patterns to meet the need of the Mercury mission, GD-A was asked to furnish VSWR information as well as antenna patterns of the two major axes.

2. Ground Station

Complete data requirements were given to GE for future Mercury flights. This includes integrated rate data obtained from both the 2,000 and 6,000 ft. baseline as well as other data such as the real time records of data fed to the Burroughs and Goddard computer during the flight.

3. Guidance Computer

Crew training information for flight simulation for 88D/MA-4 was forwarded to NASA and IBM for training purposes.

G. Pressurization and Propellant Utilization

Propellant Utilization

Analysis of the propellant utilization system failure on 13E, which resulted in premature SECO due to the wide open position of the sustainer fuel valve, has shown that the data normally monitored to ascertain correct flight behavior is not affected by this anomaly. To provide the test conductor with the information that the sustainer fuel valve does not leave its full open position, and that there be a premature SECO, special monitoring procedures have been established. The information that the fuel will be depleted prior to the scheduled SECO point, will allow Mercury control center abort for capsule descent into a maximum recovery zone prior to fuel depletion, if so desired. GD-A analysis of the 13E failure indicates to them that the most probable cause was loss of driving signal to the sustainer fuel valve servo-valve. GD-A has instituted landline recording of the servo-valve torque motor current, with redline values which will establish proper electrical continuity of the PU electrical system existing prior to launch.

Propellant Loading

The Hi and Lo lox tank level sensor wiring was interchanged with the result that the blockhouse indicator lamps registered in reverse on 88D. This situation also existed on 100D with both of these wiring errors having to be corrected at the launch site. To insure GD-A correction of this error on the subsequent boosters, direction has been sent to GD-A/San Diego, requesting that boosters presently equipped with the sensors be checked and that the source of error, the wiring drawing, be corrected.

Fluid Chemistry

The AMR staff has completed a set of fluid specifications for use on Mercury/Atlas launchings that will be effective in controlling the properties of all the fluids used in the booster. These specifications, based on the requirements of the associate agencies concerned with this area and on the data available from previous fluid chemistry tests, are considered workable and acceptable to all the concerned agencies. A CAR has been issued for incorporation of these specifications in the launch procedures for all Mercury/Atlas launchings by GD-A, starting with booster 93D. The procedures presently in practice will be used with the new chemistry specifications until revised procedures can be finalized.

H. Propulsion

On 2 August the results of the actions taken by the Air Force relative to baffled injector engine application on Mercury/Atlas boosters was presented to Messrs, R. R. Gilruth, W. C. Williams, and members of their staff at NASA/STG. These results indicated a capability of installation of baffled injector engines on the booster for Mission MA-9. NASA concurred with the actions taken and requested that SSD/Aerospace investigate the possibility of improving the availability of baffled injectors, possibly to the extent of installing them on booster 93D/MA-5.

Rocketdyne was requested to furnish a plan for an accelerated program to accomplish this end. The Rocketdyne study was completed and the results were presented to Mr. W. C. Williams and members of his staff on 23 August. This study revealed that under an accelerated program baffled injectors can be installed on booster 93D/MA-5 and on all subsequent boosters. NASA stated this was the type of approach they had in mind, but that they desired to wait until after the flight of 88D/MA-4 before making the decision to incorporate the baffled injector on 93D/MA-5.

Because of the difficulties encountered at AMR with vernier actuator teflon washer leaks, all future Mercury/Atlas boosters, commencing with 93D, will incorporate actuators having leather washers.

I. Range Safety Command

Because the three second time delay contains type 2N498 transistors (which are on the list for inspection for solder globules), all units will be recalled and replaced with new transistor inspected units.

J. Telemetry

On August 2, 1961, a portable test unit for calibrating the measurement A11OP, Adapter External Dynamic Pressure, was shipped from Martin Company, Denver, to the project office at AMR. The loan of this unit was arranged by SSD/Aerospace to be used for an "in the field", "end to end" calibration of this measurement. The calibration was performed, and a method for reading the data was developed.

Technical Direction designating the Instrumentation Configuration for all remaining Mercury/Atlas boosters was given to General Dynamics/Astronautics. The list of measurements is essentially identical to that used on Mercury/Atlas booster 88D. All Mercury/Atlas boosters following 88D will employ the "light weight " telemetry system. The data handling capacity on the "light weight" telemetry system is the same as that of the "heavy weight" telemetry system employed on 88D.

III. GENERAL

A. Flight Planning and Evaluation

The MA-5 DTO was transmitted to NASA for review and approval. Verbal approval was received on 5 September and publication is scheduled for the week of 11 September. The MA-5 DTO trajectory was forwarded to NASA on 5 September. This trajectory reflects a minus 75 pounds performance margin when latest capsule weights are utilized, and a three second hold-down time is employed.

The Aerospace inputs to GD-A for preparation of the MA-5 Range Safety Report were transmitted on 1 September. Submittal of this report to the 6555th Test Wing is scheduled for 25 September.

The Flight Evaluation Summary Reports for MA-2, TDR-594 (1101-15)TR-1, and MA-3, TDR-594(1101)TR-2, were released as scheduled on 11 August.

B. Flight Test

1. Complex 14

Complex 14 readiness was completed on 24 August to support flight of 88D. Flight was rescheduled for September firing due to decision to purge faulty transistors from electronic units .

2. AMR

No flight tests were conducted during the reporting period.

C. Pilot Safety Program

1. Comments have been received from AMRO and SSD on the Flight Safety Review General Operating Procedures report. These comments have been incorporated, and the report is now in final type. The rough draft of the Quality Assurance appendix has been distributed for comments. Co-ordination on the appendix will be expedited in order to publish the entire document in the near future.

2. The Factory Roll-Out Inspection General Operating Procedures report and the Quality Assurance appendix are in type. Coordination on these documents will be expedited in order to publish them in the near future.

D. Quality Assurance

1. Based upon recent contacts with the vendor, a new criterion has been established for selection of the Conax explosive valve to be used on Mercury/Atlas boosters. This criterion is as follows: Replacement of Conax valves is required at intervals of two years from date of manufacture. Replacement of seals is required at intervals of one year from date of manufacture.

E. Reliability

Monitoring of all Atlas firings for correlation with Mercury Program objectives continued. Missile 97D experienced a programmer anomaly which was thoroughly investigated. No problem chargeable to the programmer was revealed. GD-A was requested to prepare a comprehensive presentation of their reliability program on the Atlas missile, and particular activities undertaken to support Project Mercury. This presentation is scheduled for the latter part of September 1961.

IV. MANNED FLIGHT STATUS

A. Qualification of Critical Components

The list of Mercury Critical Components, as established by the Aerospace Mercury Program Office, has been increased by action of GD/A. This increase, which is reflected in the test status report for July (AE61-0512-2), brings the number of components on the list to 93, with 127 separate items being subject to qualification due to interchangeable parts. The test status of these components is as follows:

Qualified by	
Pre-production tests	49
Flight proof tests	8
Basis of similarity	43
Other	18

To be qualified by	
PPT	3
FPT	1
BOS	2
Other	2
Rejected - design not acceptable	1

B. Reliability Testing

1. The ASIS Reliability Test Program continued through this month. Approximately 200 hours of life testing time had accumulated on each of four canisters set aside for this purpose. Of the five canisters in the search for critical weakness tests, all were in the manufacturing area for rework during the month of August.

2. All reliability testing was completed on a Three Second Time Delay Unit with no failures observed.

3. Evaluation of Servonics pressure switches (being considered as a replacement for Bournes units) was initiated at Aerosystems Division of Bell Aircraft Corporation. No test failures have been observed to date.

C. Failure Analysis and Corrective Action

Failure analysis of the autopilot removed from Missile 88D was monitored, as were subsequent rework activities in which all Transitron transistors were removed from Missile 88D equipments. The GD-A source selection, parts procurement, incoming and in process testing and electronic fabrication and assembly methods were investigated and evaluated. A report has been prepared on the results of this study (Memo No. 1933.21-853).

VI. SCHEDULE AND MILESTONE CHARTS

The following charts include major Mercury/Atlas milestones, schedules for Boosters 88D, 93D, and 109D, and engineering task schedules.

PROGRAM SCHEDULE

MERCURY/ATLAS PROGRAM
MILESTONE SUMMARY

		FY 60												FY 61												FY 62											
		CY 59												CY 60												CY 61											
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
1	BMD Acceptance of NASA Work Order						A																														
2																																					
3	Launch Complex No. 14 Mod Complete					A																															
4																																					
5	Basic ASIS Design Complete								A																													
6																																					
7	Pilot Safety Program Formalized											A																										
8																																					
9	First ASIS Open Loop Flight Test																A																				
10																																					
11	Burroughs Computer Mod. Complete																	A																			
12																																					
13	Static Test of ASIS																																				
14																																					
15	First ASIS Closed Loop Flight Test (MA-1)																									A											
16																																					
17	Auto Pilot Stand Conversion Complete																										A										
18																																					
19	First Flight with MAC Prod. Capsule (MA-2)																									A											
20																																					
21	World Wide Tracking Network Ready																									A											
22																																					
23	First use Lightweight Telemetry																											A									
24																																					
25	First Orbital Flight																													T							
26																																					
27	Complex No. 12 Mod. Complete																													T							
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29	First Manned Orbital Flight																																T				
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1961

MA-4 (88-D) Schedule	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1 Mission Directive (NASA)					A							
2 Flt. Test Plan (GD-A)						A						
3 DTO (A/S)						A						
4 Flt. Test Directive (GD-A)												
5 Trajectory Based on Est.												
6 Wt. (A/S)				A								
7 Range Safety Report (GD-A)												
8 Final Inputs to GD-A						A						
9 Approved by Aerospace												
10 In Final Assembly	A											
11 In Missile Checkout			A									
12 Composite Test												
13 DTO Trajectory (A/S)												
14 Instrumentation Defined												
15 Roll-out Inspection												
16 Delivery to AMR												
17 Receiving Inspection												
18 Simulation Cases												
19 Specified by NASA					A							
20 Preliminary Buy-off at AMR												
21 Crew Training Material												
22 Delivered to NASA												
23 Simulation Tapes and Prog.												
24 changes delivered to												
25 Burroughs AMR												
26 Revised Data Link Test												
27 Hangar Integrated	NOT APPLICABLE											
28 On Stand												
29 GE Aircraft Tracking Test												
30 Tanking Tests												
31 FACT No. 1									T			
32 FACT No. 2									T			
33 Weighed Trajectory												
34 Launch												
35 Quick Look (A/S-LA)									T			
36 Flt. Test Evaluation (GD-A)									T			
37 Flt. Test Summary (A/S-LA)												
38												
39												
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T = Scheduled A = Accomplished

MERCURY/ATLAS PROGRAM

1961

MA-5(93-D) SCHEDULE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1 Mission Directive (NASA)						A						
2 Fit. Test Plan (GD-A)						A						
3 DTO (A/S)								A				
4 Flt. Test Directive (GD-A)									A			
5 Trajectory Based on Est.												
6 Wt. (A/S)						A						
7 Range Safety Report (GD-A)									T			
8 Final Inputs to GD-A								A				
9 Approved by Aerospace									T			
10 In Final Assembly							A					
11 In Missile Checkout												
12 Composite Test									A			
13 DTO Trajectory (A/S)								A				
14 Instrumentation Defined									A			
15 Roll-Out Inspection								A				
16 Delivery to AMR								A				
17 Receiving Inspection									A			
18 Simulation Cases												
19 Specified by NASA									A			
20 Preliminary Buy-off at AMR										T		
21 Crew Training Material												
22 Delivered to NASA									A			
23 Simulation Tapes and Prog.												
24 changes delivered to												
25 Burroughs AMR										T		
26 Revised Data Link Test												
27 Hangar Integrated	NOT APPLICABLE											
28 On Stand									T			
29 GE Aircraft Tracking Test												
30 Tanking Tests												
31 FACT No. 1										T		
32 FACT No. 2										T		
33 Launch										T		
34 Quick Look (A/S-LA)												
35 Flt. Test Evaluation (GD-A)												
36 Flt. Test Summary (A/S-LA)												
37												
38												
39												
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MERCURY/ATLAS PROGRAM

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MA-6(109-D) SCHEDULE

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1 Mission Directive (NASA)									T			
2 Flt. Test Plan (GD-A)									T			
3 DTO (A/S)											T	
4 Flt. Test Directive (GD-A)												T
5 Trajectory Based on Est.												
6 Wt. (A/S)									T			
7 Range Safety Report (GD-A)											T	
8 Final Inputs to GD-A											T	
9 Approved by Aerospace											T	
10 In Final Assembly												
11 In Missile Checkout												
12 Composite Test										T		
13 DTO Trajectory (A/S)												
14 Instrumentation Defined												
15 Rollout Inspection											T	
16 Delivery to AMR											T	
17 Receiving Inspection											T	
18 Simulation Cases												
19 Specified by NASA											T	
20 Preliminary Buy-off at AMR												
21 Crew Training Material												
22 Delivered to NASA											T	
23 Simulation Tapes and Prog.												
24 changes delivered to												
25 Burroughs AMR												T
26 Revised Data Link Test												
27 On Stand												T
28 GE Aircraft Tracking Test												
29 Tanking Tests												
30 Fact No. 1												T
31 Fact No. 2												T
32 Launch												T
33 Quick Look (A/S-LA)											5 January 1962	
34 Flt. Test Evaluation (GD-A)											12 January 1962	
35 Flt. Test Summary (A/S-LA)											9 February 1962	
36												
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T = Scheduled A = Accomplished

MERCURY/ATLAS PROGRAM

1961

ENGINEERING TASKS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1 STRUCTURES AND												
2 AERODYNAMICS												
3												
4 Buffet Loads Analysis from												
5 W. T.		A										
6												
7 Restraining Band Evaluation		A										
8												
9 Wind Tunnel Correlation with												
10 Flt Test												
11												
12 Flight Test Structural												
13 Evaluation (67D)						A						
14												
15 Buffeting Analysis (67D, 100D)							A					T
16												
17 Retropack Jettison Analysis												
18 (100D)								A				
19												
20 Angle of Attack Sensor												
21 Analysis												T
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MERCURY/ATLAS PROGRAM

1961

ENGINEERING TASKS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1 FLIGHT CONTROLS AND												
2 HYDRAULICS												
3												
4 Aerospace Task Force formed												
5 for 100-D Programmer												
6 Evaluation					A							
7 Composite Testing Rqmts												
8 for 88D					A							
9 Programmer S/N 010-0035												
10 Del. to Missile 88-D						A						
11 100-D Programmer Found						A						
12 100-D Programmer Report									T			
13 100-D Programmer Disassembly												
14 Began						A						
15 ECP 1370 Approval						A						
16 Composite Testing Changes												
17 for Modified Programmer												
18 to GD-A						A						
19 Special Test Procedures for												
20 Prog Simulator to AMR						A						
21 Countdown Procedure Changes							A					
22 Incorporation of ECP 1001												
23 (Spin Motor Monitering) on												
24 93D									T			
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1961

ENGINEERING TASKS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1 GE GUIDANCE												
2 AIRBORNE												
3 Rate Beacon												
4 AGC VS Limiting Mod								A				
5 Rate Reacquisition Mod								A				
6 Waveguide									T			
7 Pressurization						A						
8												
9 Decoder												
10 Pulse Transformer								A				
11												
12 Ground												
13 Rate Leg Extension												
14 P Dot						A						
15 Q Dot												T
16 Parallax Computer and												
17 Servos							A					
18 Rate Reacquisition						A						
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AEROSPACE FORM
1961 - BOND
1961A - VELLUM

T = Scheduled A = Accomplished

PROGRAM SCHEDULE

	MERCURY/ATLAS PROGRAM	FY 60												FY 61												FY 62											
	ENGINEERING TASKS	CY 59												CY 60												CY 61											
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
1	ASIS																																				
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3	Reliability Testing																																				
4	ASCU																																				
5	Search for critical weakness (SFCW)																								T												
6	Life																								T												
7	Pressure Switches																																				
8	SFCW																								T												
9	Life																								T												
10	Three-second time delay																																				
11	SFCW																								T												
12	Life																																				
13	Forward Rate Gyros																																				
14	SFCW																							A													
15	Life																																				
16	Delta Pressure Orifice Particle Filters																																				
17	Lab Testing																							A													
18	Installation Authorization																								A												
19	First Flight Article (88D)																										T										
20	Servonic lox tank pressure switches																																				
21	SFCW																										T										
22	Life																										T										
23	Flight Test																																				
24	Open loop (88D)																										T										
25	Installation authorization																										T										
26	First Flight Article (93D)																										T										
27	Modifications Resulting from 100D																																				
28	Design and Test																									A											
29	Production Release																									A											
30	First Flight Article (88D)																										A										
31	Real Time Recording Test Equipment																																				
32	Design, fabrication, and test																											A									
33	Test procedures revision complete																												A								
34	First Unit available for composite test use																													T							
35	Modification of AMR Test Equipment																														T						
36	Review of 88D Abort Subsystem																													T							
37	Schematic																																				
38	Review of 93D Abort Subsystem Sch.																														T						
39																																					
40																																					
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AEROSPACE FORM 2030 VELLUM 2030W BOND

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PROGRAM SCHEDULE

MERCURY/ATLAS PROGRAM
ENGINEERING TASKS

FY 60 | FY 61 | FY 62

CY 59 | CY 60 | CY 61 | CY 62

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1		1
2	QUALITY ASSURANCE	2
3		3
4	Model Specification Approval	4
5	50D (AZD-27-026A)	5
6	67D (AZD-27-026B)	6
7	100D (AZD-27-026C, 1 Feb 61)	7
8	88D (AZD-27-026C, 1 Feb 61)	8
9	93D	9
10	Comparison Report	10
11	Configuration Established	11
12	50D, 67D	12
13	100D, and Sub	13
14		14
15	Report Available	15
16	50D (None)	16
17	67D	17
18	100D (Revised)	18
19	88D	19
20	93D	20
21		21
22	Qualification Status Reports	22
23	67D (Partial)	23
24	100D (Partial)	24
25	88D	25
26	93D	26
27		27
28	Spare Parts Provisioning Program	28
29	Review of Astronautics Plan	29
30	Final Provisioning Approval	30
31	AMR Spare Parts Availability	31
32	Status Reports	32
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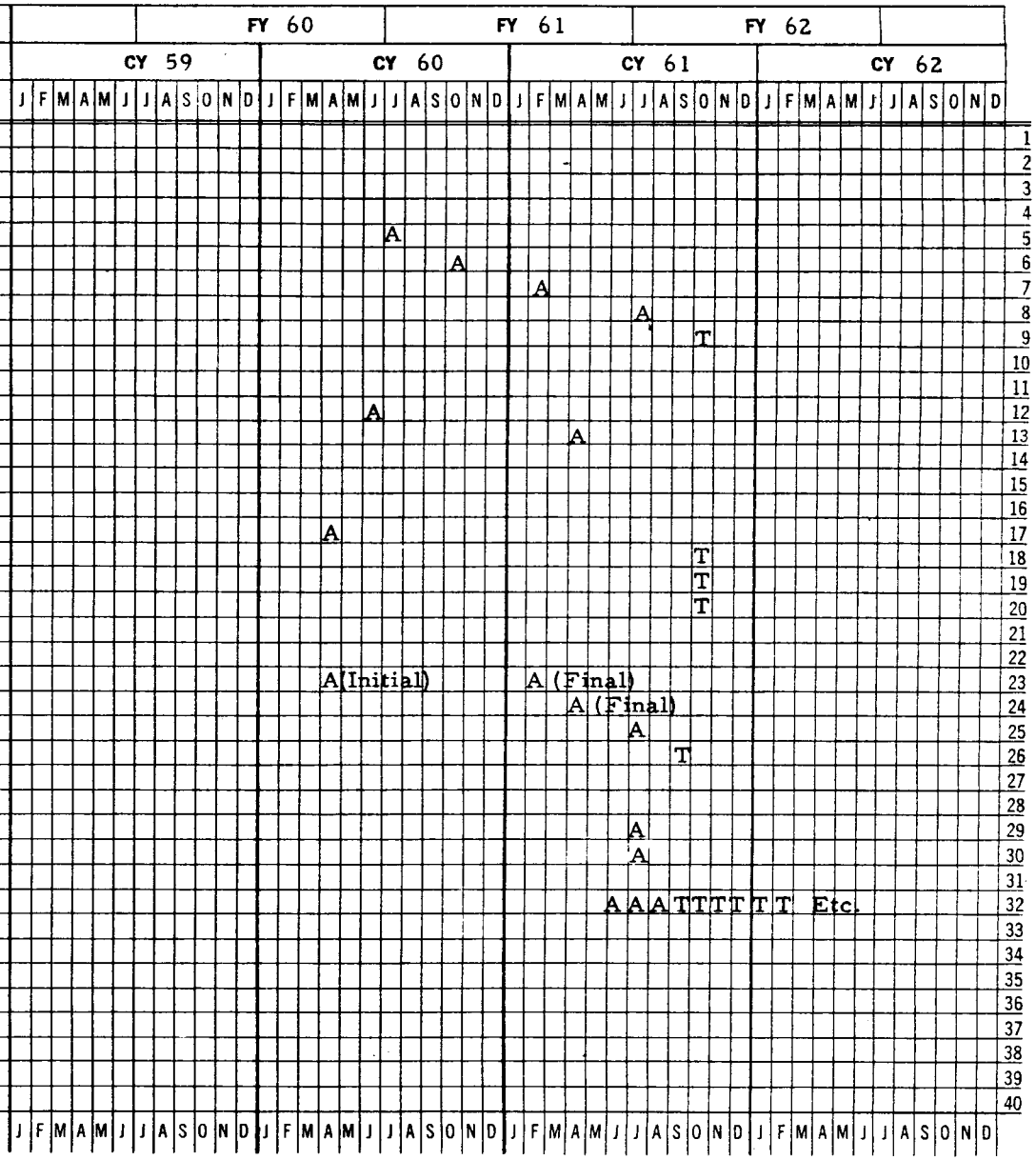

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AEROSPACE FORM 2030 VELLUM 2030W BOND

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PROGRAM SCHEDULE

MERCURY/ATLAS PROGRAM
ENGINEERING TASKS

FY 60 | FY 61 | FY 62

CY 59 | CY 60 | CY 61 | CY 62

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2	RELIABILITY	2
3		3
4	ASIS Reliability Analysis Complete	4
5	(by Aerospace) A	5
6	ASIS Reliability Test Program Comp T	6
7		7
8	Mercury Malfunction Analysis A T T etc	8
9		9
10	Booster Reliability Prediction A T T etc	10
11		11
12	Mercury Subsystem Reliability Status T	12
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